Based on a Symposium Co-sponsored by the Black River RAP and IJC's Great Lakes Water Quality Board Lorain, Ohio, October 8, 1998

Protecting What Has Been Gained in the Black River

1999

International Joint Commission

United States and Canada

Black River RAP

Our River, Our Responsibility

Remedial Action Plan

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http://oberlin.edu/~envs/
http://www.noaca.org
http:/www.ijc.org/boards/greatw.html

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Protecting What Has Been Gained in the Black River

Based on a Public Symposium convened by the Black River Remedial Action Plan Coordinating Committee and the International Joint Commission's Great Lakes Water Quality Board on October 8, 1998 in Lorain, Ohio

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EXECUTIVE SUMMARY

On October 8, 1998 the Black River Remedial Action Plan (RAP) and International Joint Commission's Great Lakes Water Quality Board co-sponsored a public symposium in Lorain, Ohio. The participants of the event were challenged by the symposium theme of "Protecting What's Been Gained in the Black River." Over 125 decision-makers from governments at all levels, industries, environmental groups, faculty and students from surrounding universities, and concerned citizens gathered to:

- **learn about the progress that has been made in the Black River watershed in recent years;**
- **share and celebrate successes; and**
- **provide advice on required future activities to protect and rehabilitate the Black River watershed.**

This symposium was designed to be an action-oriented public meeting and to provide a forum for the exchange of ideas pertaining to watershed management. The event began with research presentations focusing on improvements in the river and what remains to be done in terms of future action. Breakout sessions were used in the afternoon portion of the program to spur interaction between Water Quality Board members, Black River RAP Coordinating Committee members, key watershed stakeholders, and concerned citizens on specific issues related to the protection and rehabilitation of the Black River watershed.

The Symposium was well received by all participants. Conclusions and recommendations from the day's proceedings were compiled by the Symposium Steering Committee and include the following (please consult the summaries of the afternoon breakout sessions for more detailed discussion and recommendations):

- **Substantial progress is being made in implementing the Black River RAP and restoring uses throughout the watershed (e.g., progress toward elimination of liver tumors in the brown bullhead population, improvements in sediment quality, etc.).**
- **However, much needs to be done to protect what's been gained and to further rehabilitate degraded areas in the watershed. Strategies are needed to address land use changes that threaten aquatic life communities and habitat. The Black River RAP has identified protection of the riparian corridor and urban sediment and erosion control programs as especially urgent. Participants confirmed the importance of protecting and restoring riparian corridors as a key factor in protecting what's been gained.**
- **The community-based process embodied in the Black River RAP has taken a leadership role in developing and advancing efforts to protect the Black River and this process needs to be sustained for the future.**

- This community-based process requires the active involvement of informed citizens who are ecologically literate and willing to act as stewards of the watershed in their own backyard.

- As substantial progress has been made in controlling point sources of pollution, more effort now needs to be placed on addressing land use activities that contribute to nonpoint source pollution problems.

- Regulatory mechanisms should be considered to eliminate or reduce the nonpoint problems associated with failing or poorly maintained home sewage disposal systems.

- Greater emphasis should be placed on addressing habitat components in land use planning, local ordinances, zoning, etc.

- Participants recommended that, as a priority, the County enact an Urban Sediment Erosion Control Program to address stormwater management issues of new development. The efforts of the Lorain County Alliance to encourage an interjurisdictional approach to the stormwater management problems are applauded and should continue to be supported by the Black River RAP so that a comprehensive approach, that considers both water quantity (flooding) and water quality issues at the watershed level, is pursued. There needs to be a better understanding of how to deal with stormwater as it passes through one community to the next.

- There is a need to more effectively engage the public in understanding the importance of and support for long-term environmental monitoring. Citizens can have a direct role in this effort, but this means that realistic goals for monitoring programs by citizen volunteers need to be developed, goals that recognize what citizens can contribute practically. To achieve this, effective volunteer training and data quality assurance procedures must be established.

- The Black River RAP should heighten its profile in the community so that the important messages of the RAP program are more widely heard and acted upon.

- From a nonpoint source perspective, much of the "low hanging fruit" has been picked. Therefore, federal efforts through the Natural Resource Conservation Service should be focused on "picking the next lowest hanging fruit" which means implementing a targeted initiative at farmers who have not implemented best management practices (BMPs). Much more needs to be done to get these local farmers to expand use of BMPs in order to meet our collective goals of restoring and protecting all uses in the Black River watershed.

- Ohio EPA should continue to sustain the Black River RAP process. Ohio EPA, Ohio DNR, and other state agencies should focus state funds on implementing high priority actions and projects identified by the Black River RAP Coordinating Committee. Ohio EPA should consider allowing Division of Environmental Financial Assistance funds to be used more readily for RAPs.

- Participants further recommended that federal legislation is needed that recognizes and supports the community-based approach to watershed planning and implementation.

- **The recent study by Ohio DNR that evaluated the Black River's potential for Scenic River status concluded that substantial portions of the riparian zone are in excellent condition, but need a sustained focus effort to preserve them. The Black River RAP Coordinating Committee should continue and expand its efforts to promote riparian protection at the household, community, and watershed level.**

- **The International Joint Commission and its Great Lakes Water Quality Board must continue to be champions for community-based RAP processes. The International Joint Commission and the Great Lakes Water Quality Board are in a unique position to celebrate the progress of RAPs and help sustain community-based RAP groups working to restore and sustain uses in the Areas of Concern.**

- **Finally, the Great Lakes Water Quality Board should continue to convene public meetings with RAP groups in Areas of Concern. Such meetings give the public an opportunity to learn more about how local RAP efforts fit into the larger Great Lakes context. Further, these public meetings give members of the Water Quality Board and RAP groups important opportunities to meet, share, and learn from each other. This also provides a wonderful community building project for local RAP groups.**

INTRODUCTION

On October 8, 1998 the Black River Remedial Action Plan (RAP) and International Joint Commission's (IJC's) Great Lakes Water Quality Board co-sponsored a public symposium in Lorain, Ohio (see Appendix I for program). The participants of the event were challenged by the symposium theme of "Protecting What's Been Gained in the Black River." Over 125 decision-makers from governments at all levels, industries, environmental groups, faculty and students from surrounding universities, and concerned citizens (see Appendix II for list of symposium participants) gathered to:

- **learn about the progress that has been made in the Black River watershed in recent years;**
- **share and celebrate successes; and**
- **provide advice on required future activities to protect and rehabilitate the Black River watershed.**

What is the Black River RAP?

The Black River, like many rivers in the Great Lakes Basin Ecosystem, has been impacted by urban, agricultural, and industrial development. In 1985, the IJC's Great Lakes Water Quality Board recognized the river as having impaired beneficial uses and designated it one of 43 "Areas of Concern" in the Great Lakes Basin Ecosystem. An Area of Concern is a geographical area that fails to meet the objectives of the U.S.-Canada Great Lakes Water Quality Agreement where such failure has caused or is likely to cause impairment of beneficial use or impairment of the area's ability to support aquatic life.

In response, the Ohio Environmental Protection Agency (Ohio EPA) formed a committee of local public agencies, businesses, and citizen groups, known as the Black River RAP Coordinating Committee, to develop a RAP for the Black River. One of its first acts was to proclaim the entire Black River watershed as an Area of Concern. The RAP's purpose is to define the actions that are necessary to effectively overcome the current water quality problems in the watershed and to restore beneficial uses in the river. The RAP has made considerable progress since 1992, but more needs to be done in order to fully restore beneficial uses.

What is the International Joint Commission?

The IJC assists both the Canadian and U.S. governments in preventing and resolving problems in the lakes and rivers that lie along the border of the two countries. The Great Lakes Water Quality Board is the principal advisor to the International Joint Commission on all matters relating to the Great Lakes Water Quality Agreement. The Water Quality Board's job is to provide independent advice to the International Joint Commission on ecosystem status and management of the Great Lakes. The Board is made up of senior program managers from state, provincial, and federal regulatory and resource management agencies.

Structure of the Symposium

This symposium was designed to be an action-oriented public meeting to provide a forum for the exchange of ideas pertaining to watershed management. The event began with research presentations on recent improvements in sediment and water quality conditions in the river and what remains to be done in terms of future actions. Breakout sessions were used in the afternoon portion of the program to spur interaction between Water Quality Board members, Black River RAP Coordinating Committee members, other key watershed stakeholders, and concerned citizens on specific issues related to the protection and rehabilitation of the Black River watershed. The purpose of this report is to summarize the symposium presentations and to present the key findings and recommendations from the symposium.

It should also be noted that a student forum was held at Oberlin College on the evening of October 7, 1998 (see Appendix III for a brief description). This forum provided students, professors, and citizens a unique opportunity to ask questions of members of the Water Quality Board. It was very well received by all who participated.

STATUS AND PERSPECTIVES ON THE BLACK RIVER

The morning program was dedicated to a series of presentations by investigators who have studied environmental trends and conditions in the Black River. These were intended to provide the audience with a perspective on progress that has been made in restoring beneficial uses in the Black River and to set the stage for discussions in the afternoon on next steps to continue progress. The first speaker was Don Schregardus, Director of Ohio EPA, who set the stage for the entire symposium with historical perspective on water quality in the Black River and management challenges for the future. The next presentations were by environmental scientists on the staff of the Ohio EPA - Division of Surface Water who reported on results from an intensive chemical and biological water quality survey conducted on the Black River in 1997. Paul Anderson discussed findings concerning water quality in the ship channel and Roger Thoma reported on the current status of fish communities and habitat in the river. These were followed by presentations by Paul Baumann of the U. S. Geological Survey and Ohio State University who discussed trends in the incidence of liver cancer tumors in brown bullhead found in the Black River, and by Allen Burton of Wright State University who discussed results of a study of toxicity of Black River sediments aimed at assessing the effectiveness of contaminated sediment dredging operations. Russ Gibson of the Ohio Department of Natural Resources (DNR) - Division of Natural Areas and Preserves ended the session with a report on his recent investigation of the Black River's potential for designation as a State Scenic River.

Protecting What's Been Gained in The Black River

Donald Schregardus, Director of Ohio EPA

I am happy to welcome all of you to the Black River Area of Concern, particularly those of you new to the RAP process and the Water Quality Board. I know the Water Quality Board has long been familiar with the problems of the Black River through their initiation and support of the RAP program. I know they've also been following some of our progress as the Board's Sediment Priority Action Committee included the removal of PAH contaminated sediment adjacent to USS/Kobe property as a case study in their white paper on sediment remediation.

This meeting site is the same location where we held the public kick-off for the Black River RAP back in 1991. We also met with the IJC here in 1994 to discuss their review of the Stage 1 Report for the Black River RAP. The IJC gave that Stage 1 Report a pretty favorable review, acknowledging the Black River RAP Coordinating Committee for all the effort,

coordination, and collaboration that went into preparing that report. I'm happy to see a number of you here today who were at that initial meeting back in 1991. We certainly appreciate your continued commitment to this long-term process.

Many of you know that I spent the early years of my career working on the Black River out of U.S. Environmental Protection Agency's Eastern District Office in Westlake. As in many of our state waterways, point sources directly to the Black River caused severe pollution problems. Regulatory and enforcement actions have reduced or eliminated the worst impacts of point sources (i.e., discernable sources of pollution such as a factory pipe) by mandating upgrades to sewage treatment plants and placing stronger restrictions on industrial dischargers. Indeed, the RAP Stage 1 report concluded that most of the remaining problems are now associated with nonpoint sources (i.e., sources of pollution in which pollutants are discharged over a widespread area or from a number of small inputs rather than from distinct, identifiable sources), particularly in the upper watershed.

Based on the results of the Stage 1 report, the RAP adopted a riparian zone restoration initiative focused on protecting and restoring the areas directly adjacent to the river. Protecting these areas would also require implementation of programs throughout the watershed to prevent pollutants from reaching the riparian zone in the first place.

In 1997, a strategic plan was developed by the RAP that included a number of activities to reduce nonpoint source impacts. Streambank stabilization projects to slow erosion while enhancing habitat were encouraged. RAP volunteers assisted in designing and installing willow plantings, tree revetments, and other bioengineering techniques to protect the streambanks using natural materials. Projects were implemented at Indian Hollow Golf Course and at several sites in the Lorain County Metroparks.

Also in 1997, in partnership with the Black River RAP, the Lorain County Community Development Department received a grant from the Lake Erie Protection Fund to develop a model township comprehensive plan to address unplanned development and provide alternative approaches to manage growth. This plan would be created from a watershed or ecosystem perspective. It is hoped that such a plan would prevent or reduce nonpoint source runoff in developing areas. It is also anticipated that this plan will be used as a model by other townships in the Area of Concern to develop their own township plans.

Earlier, in 1992, the Black River Area of Concern had been the recipient of a Clean Water Act Section 319 demonstration grant to buy down the cost of conservation tillage equipment, making it easier for farmers to adopt and use methods that would reduce nonpoint source runoff. This project was very successful. Based on the success of the 1992 Section 319 grant, RAP partners worked together to prepare another 319 proposal to support the numerous nonpoint source reduction activities listed in the 1997 strategic plan. In this proposal, the Lorain and Medina County Soil and Water Conservation Districts would work with watershed farmers to implement precision farming technology and install stream conservation practices. John Carroll University would conduct water quality monitoring in the watershed to measure the impact of these conservation practices. The Lorain County General Health District and the Medina County Health Department would inventory and sample home sewage disposal systems to determine where systems were failing. Seventh Generation would coordinate public education and awareness activities, recruit and train volunteer water quality monitors, and provide overall administrative assistance. Ohio EPA and Ohio DNR would provide technical assistance. With the 319 grant and the associated state and local match, this project would provide $570,000 to benefit the Black River watershed.

I am happy to report that this proposal was approved and currently is being implemented. This innovative, collaborative proposal involving many partners working toward a common goal of reducing nutrient, bacterial, and sediment loadings in the Black River watershed is a good example of the type of project that can result from the RAP process.

I've mentioned a few of the past problems in the Black River Area of Concern and what has been done to address them. In following presentations we will hear about the current state of the river and reflect how effective some of these remedial actions have been. But we will also hear that much more still needs to be done to restore all the beneficial uses of the Black River.

Restoring the river will require continued implementation of regulatory and enforcement actions. It may be necessary to develop new regulations or new ways of implementing the old regulations to further reduce pollutant loadings.

Restoring the river will require remedial actions such as re-establishing habitat in and along the river. It will require additional research and monitoring to understand what is happening in the river and how it needs to be fixed. It may require learning new techniques and adopting new management practices.

The Black River RAP process encourages the participation of the local communities in restoring their river. Many times that first means raising the profile of the river and explaining why the river is such an important resource. People need to learn how their actions may be impacting their local rivers. The Black River RAP is currently developing a public education/outreach and marketing plan to help accomplish this.

The concept of community-led and supported efforts to cleanup waterways from a watershed perspective is a tried and true process. Many of the RAPs around the Great Lakes are successfully, if slowly, accomplishing their goals. Similar efforts have helped to address the environmental problems of Chesapeake Bay and Puget Sound. There are now a number of watershed groups in Ohio. The Clean Water Action Plan announced by President Clinton early this year encourages the use of locally-led partnerships to restore the 40 percent of U.S. waterways which are still not fishable and swimmable.

RAPs are an opportunity to be creative and innovative in designing and implementing actions to improve environmental quality. As you listen to the presentations this morning, note the progress that has been made, how the progress was made, and where problems remain. The breakout sessions will allow you the opportunity to address particular topics in more detail and consider the additional actions needed to further improve the Black River. This is your chance to get passionate about an issue in your own backyard.

I believe the RAP process can be a strong tool to restore the environment. But it gains its strength from the community that supports it. So I encourage you to be involved and stay involved.

Fish Communities and Habitat Status in the Black River Watershed

Roger Thoma, Ohio EPA

Ohio EPA uses indices of fish communities and habitat as critical elements of a management strategy for Lake Erie tributaries. Most Lake Erie tributaries in Ohio are designated for protection of warmwater habitat. Attainment of aquatic life uses in warmwater habitat is determined by using various biological community performance measures. The Index of Biotic Integrity (IBI) is one such index being used to help make a determination on attainment of aquatic life uses in warmwater habitat. The IBI incorporates 12 fish community metrics within three broad categories (i.e., species richness and composition, trophic composition, and fish abundance and condition).

Ohio EPA performs biological and water quality monitoring throughout the Black River watershed. Figure 1 presents a Black River watershed map depicting selected river mile locations on monitored streams (this map can be used in conjunction with other figures

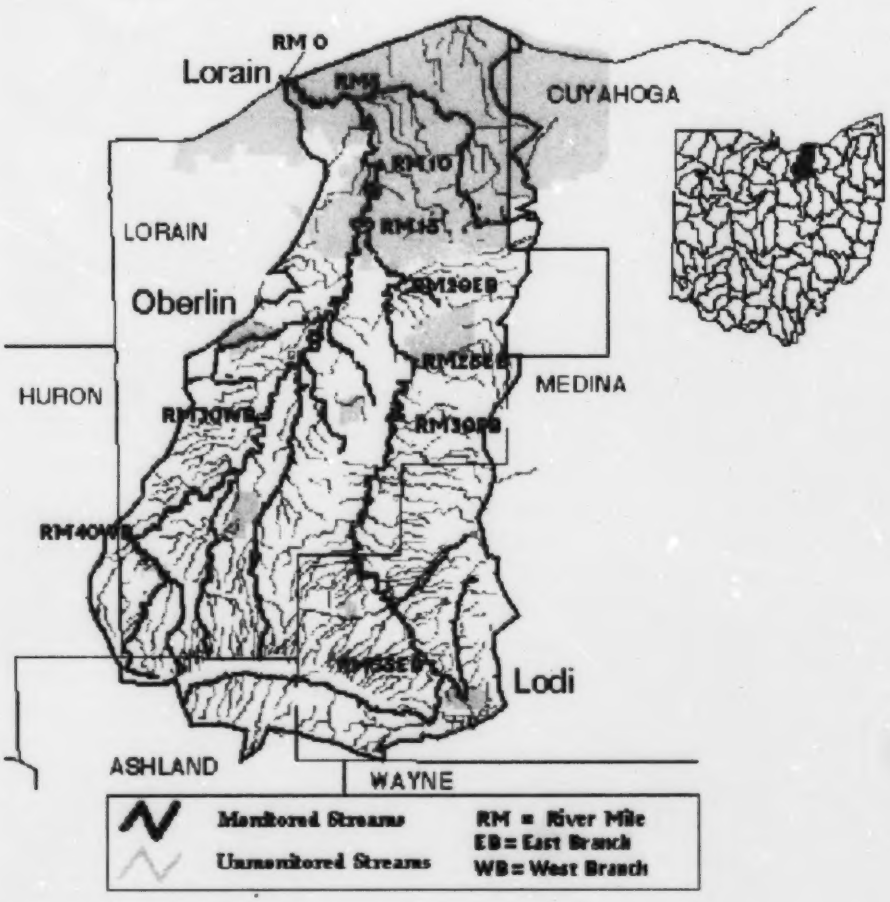

Figure 1. A Black River watershed map depicting selected river mile locations on monitored streams.

presented in this report to help determine river mile location within the watershed). The Black River fish community has been monitored by the Ohio EPA since 1982. Initial data indicated that impacts to biological communities were being strongly affected by discharges in Elyria and contaminated sediment in the Black River lacustuary (i.e., that portion of the river influenced by Lake Erie, approximately the lower six miles of the river), resulting in nonattainment throughout the Black River mainstem. Monitoring in 1992 showed recovery from impacts associated with the Elyria Wastewater Treatment Plant discharge in the mainstem (Figure 2), while the East and West branches were found to be widely impacted from nonpoint pollution (sediment and nutrients) mostly originating from agricultural activities. Further studies in 1997 have shown continued recovery in the mainstem, especially in lotic portions (i.e., flowing water) where attainment of warmwater habitat criteria for fish communities has now been reached. East and West branch fish communities still remained impacted by nonpoint source pollution which is also affecting lacusturine communities. A site at the mouth of the lacustuary was able to reach warmwater habitat status in 1997. Examination of external anomalies (i.e., deformities, eroded fins, lesions, and tumors) in fish has shown a continuing decline for the study period as environmental disturbance has been reduced.

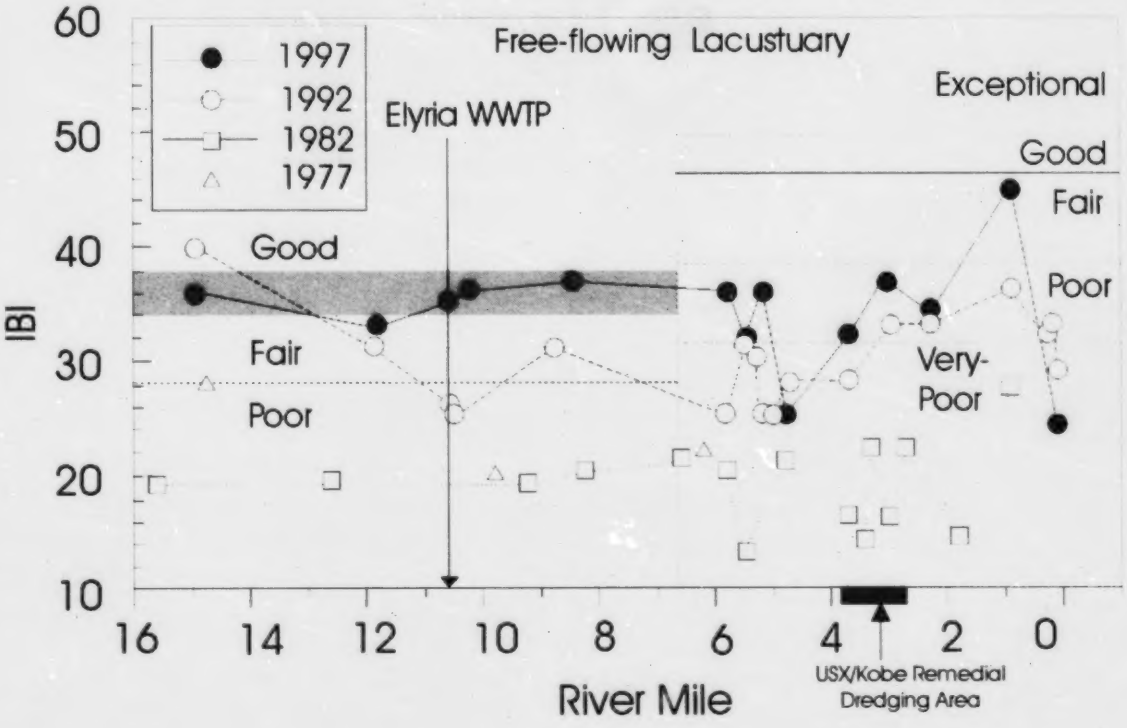

Figure 2. Index of Biotic Integrity (IBI) data from the Black River (1977, 1982, 1992, and 1997).

Ship Channel Water Quality and Causative Factors

Paul Anderson, Ohio EPA, Division of Surface Water

Each year Ohio EPA conducts intensive biological and water quality surveys in 10-15 different study areas. These interdisciplinary monitoring efforts are coordinated on a watershed scale. Each watershed is scheduled to be surveyed approximately every five years. The most recent intensive survey of the Black River watershed was conducted by Ohio EPA in 1997.

Water and sediment quality data from the lower river in 1997 indicate that although concentrations of some pollutants, such as ammonia (NH_3-N), have been adequately reduced, significant water quality problems persist. This is mainly due to high concentrations of suspended solids (Figure 3) and other pollutants such as nitrate/nitrite-nitrogen (Figure 4). Loadings of suspended solids from the watershed have resulted in an extremely turbid (i.e., muddy or cloudy with sediment) system which results in an inhibition of primary productivity (i.e., photosynthetic conversion of sunlight into algae) and depletion of dissolved oxygen (Figure 5). The behavior of the lower Black River ecosystem mimics that of a reservoir in that the long residence time of the water in the system leads to thermal stratification, oxygen depletion, and other pronounced differences in water chemistry between surface and bottom waters.

Analysis of sediments collected in 1997 indicates that concentrations of polynuclear aromatic hydrocarbons (PAHs) have been significantly reduced in the Black River sediments, although residual concentrations remain throughout the lower river. Of significant concern at present are the relatively high concentrations of heavy metals, resulting in poor sediment quality. The presence of elevated heavy metals concentrations in sediments collected from the entire length of the Black River mainstem indicates that sources of these metals to the river exist throughout the watershed and cannot be attributed to any single source.

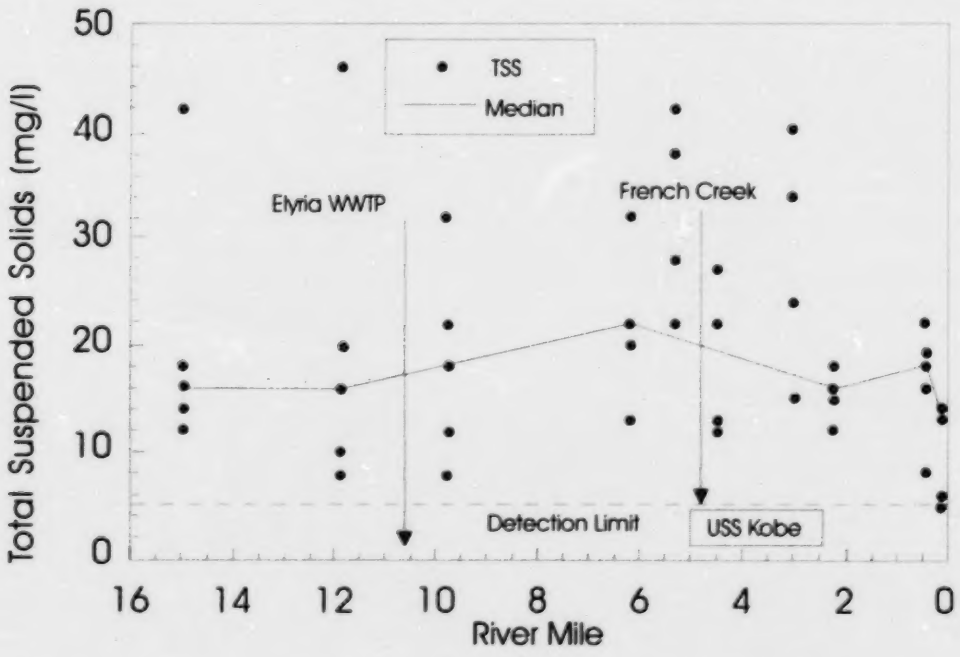

Figure 3. Concentrations of total suspended solids in the Black River, 1997

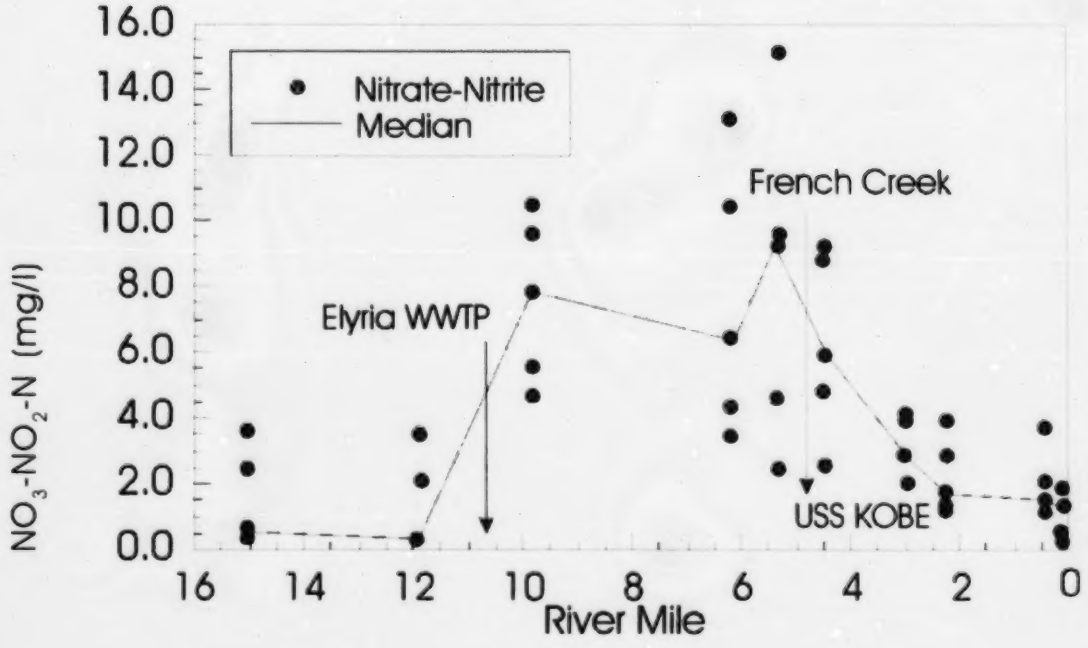

Figure 4. Concentrations of nitrate/nitrite-nitrogen in the Black River, 1997.

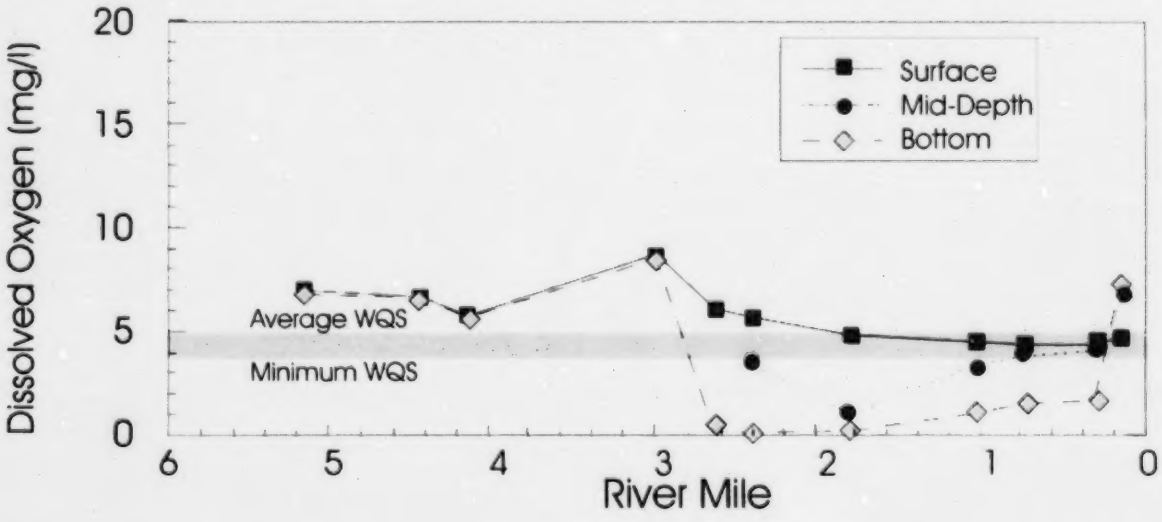

Figure 5. Dissolved oxygen concentrations in the lower Black River as measured by Ohio Environmental Protection Agency on August 10, 1998.

Improvement in the Health of Brown Bullhead from the Black River

Paul Baumann, U. S. Geological Survey and Ohio State University

Since 1980, liver tumors in brown bullhead and polynuclear aromatic hydrocarbons (PAHs) in sediment have been researched in a series of studies on the Black River near Lorain, Ohio. In the early 1980s, the liver cancer prevalence in mature fish (age 3 and older) was high, ranging from 22% to 39%. These elevated cancer rates corresponded to high levels of PAHs in the sediment, including human carcinogens such as benzo(a)pyrene. The PAHs were produced in the process of making coke from coal and had been released over a long time period from an upstream coking facility (USX). PAHs are not very soluble in water and thus tend to accumulate in sediment near and downstream from the coke plant outfall.

In 1983 this coking plant was closed and by 1987 the PAHs in the top several centimeters of sediment had declined to about one-hundredth of their former concentration. This decline was probably facilitated in part by deposition of cleaner sediment from upstream over the more contaminated layers. Coincidentally, the liver tumor prevalence in brown bullhead started to decline in 1985, and by 1987 was only about one fourth of that in the early 1980s.

In 1990, some years after a U. S. EPA Consent Decree, the area having the most contaminated sediment (just downstream from the coke plant outfall) was dredged. Surveys for cancer were again conducted in 1992 and 1993. Liver tumor frequencies in mature bullhead were found to be as high or higher than in the early 1980s. Liver cancer prevalence in those two years was between 46% and 48% for mature fish. However in 1994 liver tumor prevalence declined to 9%, with fish of age 3 having no liver cancer at all. These age three fish from 1994 were the first group sampled that were not present during the 1990 dredging. Tumor prevalence increases as fish become older, however fish of age 3 from earlier years exhibited high liver cancer rates (over 30% in 1982).

Data from 1995 and 1996, while based on small sample sizes, indicate that liver cancer prevalence has remained low (8%). A sample of 45 bullhead taken from the Black River this May (1998) had only a single fish (2%) with grossly visible lesions, another indication that the liver tumor prevalence has fallen. Furthermore, the percentage of the bullhead population with livers completely free of any neoplastic changes, including early alterations of liver cells (hepatocellular alterations) strongly supports the view that the population is much healthier (Figure 6). In 1982 only 23.5% of mature bullhead had normal livers and the percentages in 1992 (37%) and 1993 (27%) were almost as bad. However in 1994 68% of the mature bullhead had normal livers and the prevalence of healthy livers increased to (86%) in 1995-96.

These data are consistent with the hypothesis that the increase in tumor prevalence in 1992 and 1993 was caused by exposure to buried PAH-contaminated sediments released by the dredging. However, this increase was restricted to the age groups present in the river during the year of the dredging. Fish hatched in years after the dredging appear to have a reduced cancer prevalence. Evidence to date indicates a major improvement in the health of Black River fish.

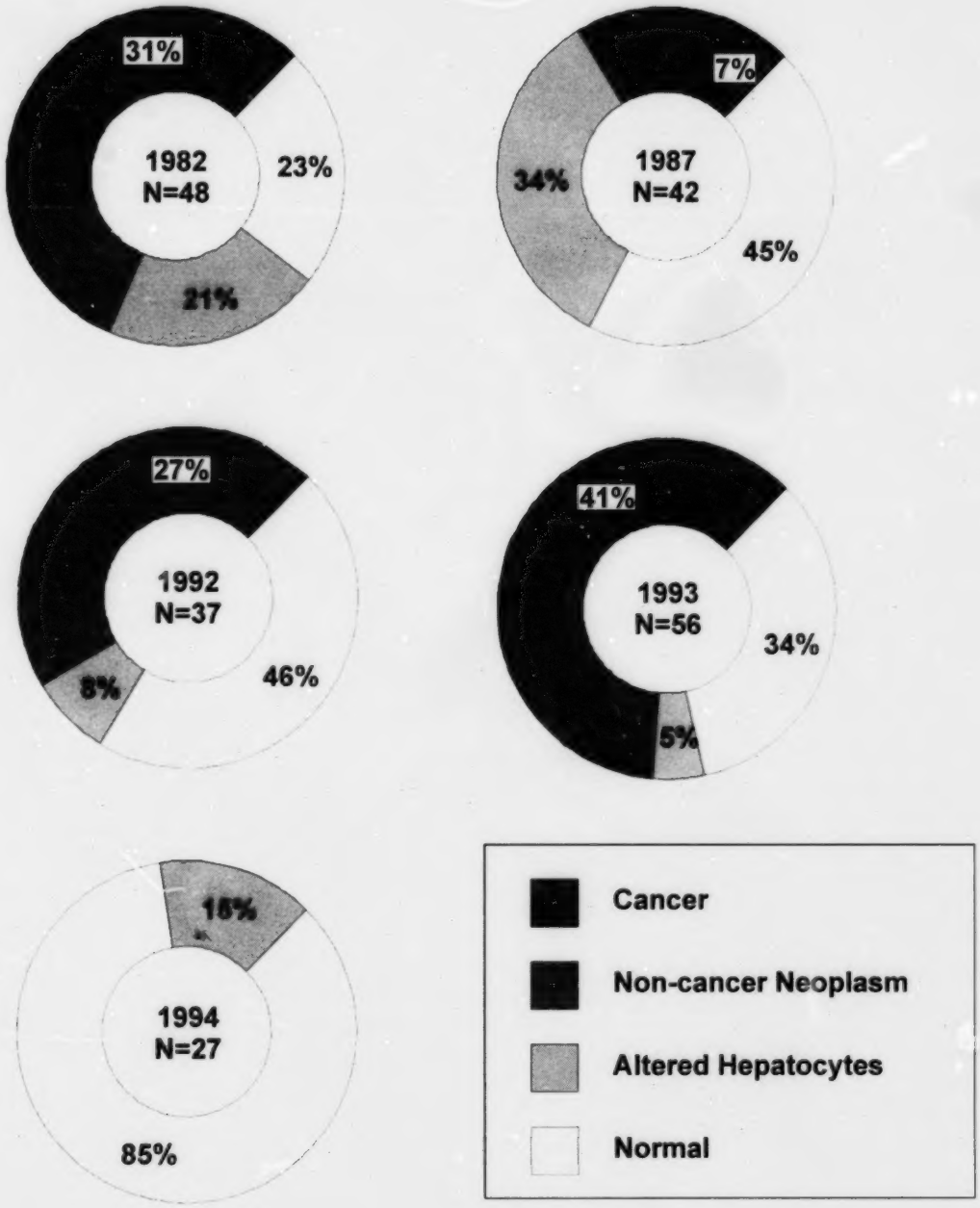

Figure 6. Percentage of age 3 brown bullheads from the Black River having various liver lesions.

Assessment of Sediment Quality in the Black River Watershed

G. Allen Burton, Jr. and Carolyn Rowland, Institute for Environmental Quality,
Wright State University

The U.S. EPA Great Lakes National Program Office funded Wright State University to assess the sediment quality in the lower Black River in collaboration with the Ohio EPA and Dr. Paul Baumann (U. S. Geological Survey). This one year study was designed to assess the effectiveness of the previous dredging activities which were aimed at removing sediment contaminated with polynuclear aromatic hydrocarbons (PAHs). Wright State University focused on measuring the toxicity of the sediment and overlying water in the lower 8 km (5 miles) of the river and comparing those findings to upstream reference stations. Surficial and deeper buried sediment was analyzed to determine whether contaminant gradients exist in the river. Toxicity testing included both laboratory and *in situ* field exposures of four aquatic species: Pimephales promelas (fathead minnow), Ceriodaphnia dubia (water flea), Hyalella azteca (amphipod), and Chironomus tentans (midge).

In Fall 1997 a survey was conducted during base flow conditions. The survey revealed a wide range of toxicity existing in the sediment and/or overlying waters. The highest levels of sediment toxicity noted in laboratory exposures occurred at River Miles (RM) 15.0, 2.9, 2.4, 0.9 and 0.4. The East Branch of the Black River RM 18.9, and the lower Black River at RM 11.6, 5.2, 4.8, and 2.3 showed little to no mortality. Growth of the amphipod and midge in the upper reference site was good. Amphipod growth was lowest at RM 0.4, 2.3, and 5.2; while for the midge, growth was lowest at RM 0.4, 2.4, and 9.8. Surficial sediment tended to be less toxic (survival and growth (amphipod only)) than deeper, more historical sediment in most cases. *In situ* toxicity testing allowed for more realistic exposures to both sediment and overlying waters and showed better survival of organisms overall. However, high mortality of some test organisms was observed at RM 2.3 and 0.4. Initial findings indicated that photo-induced toxicity from PAHs may be a factor at some of these sites, as there was lower survival in near-surface water exposures.

A survey of the indigenous snail, Physella gyrina, in the study area showed genetic patterns indicative of stress at 2 locations. When the DNA pattern of individuals within a population is similar, it suggests the population has been adversely impacted and is less diverse. This loss of genetic diversity can equate to greater susceptibility to stress and general population decline. At RM 5.2 above KOBE and French Creek and in Kline Ditch (a tributary of French Creek), a high degree of genetic similarity was observed. The Kline Ditch area has had water quality problems attributed to nearby fly ash disposal sites (Ohio EPA, personal communication). In addition, there was a significant relationship in the Black River study area between declining fish health (IBI scores) and snail genetic patterns.

In the Spring of 1998, *in situ* exposures of test organisms during a high flow event showed little to no acute toxicity existing at most test sites. This survey did not focus on sediment, rather organisms were only exposed to near surface waters during very turbid conditions. Photo-induced toxicity due to PAHs is not a factor when turbidity is high. Therefore, the greater toxicity observed at base flow conditions, when turbidity is lower, appears to be a PAH effect. This effect can occur at low to sub microgram per liter PAH concentrations.

The water column acute toxicity at base flow and the sediment acute toxicity (survival and/or growth) observed in the downstream area suggest the PAHs may still be a primary stressor in the lower Black River. Sediment that was several centimeters deep tended to be more toxic

than surficial sediment and may be exposed during resuspension events (e.g., storms, boat traffic, dredging). However, chemical analysis of sediment did not show elevated levels of PAHs. Total sediment metal concentrations were elevated and tended to be higher downstream. Acute toxicity during high flow suggests that the impacts of nonpoint source runoff and stormwater inputs are less severe. However, since only acute toxicity was measured, it is unknown whether chronic toxicity may exist due to nonpoint source runoff.

Understanding the Characteristics and Criteria for the Designation of a Scenic River

Russell W. Gibson, Ohio DNR

In May of 1996, the Division of Natural Areas & Preserves (DNAP) initiated a study of the Black River for possible designation as a state Scenic River. A study team was organized. Team members included representatives of the Black River RAP, Ohio EPA, the U. S. Department of Agriculture, Rivers Unlimited, and program staff from the Scenic Rivers Program. Following an eighteen month period of extensive research and literature review, a comprehensive inventory of the Black River watershed was completed and a compilation of findings prepared and published. This information was then analyzed with respect to designation criteria. Following this analysis, it was determined that the Black River failed to meet Scenic River designation criteria and was not recommended for inclusion into Ohio's Scenic Rivers System.

Natural, historic, and cultural characteristics of the Black River were examined and compared to designation criteria. Criteria are designed to evaluate the extent that a river retains its natural attributes and whether or not it possesses unique cultural or historical values of statewide significance. This study assessed the following general characteristics:

- integrity of the riparian corridor;
- water quality;
- integrity of the biological communities;
- stream channel integrity and modification; and
- urban and industrial development.

Scenic river criteria require that 25% of a stream's length must be forested outward from the river to a width of 91 m (300 feet) or greater. All branches of the Black River were determined to meet this criterion. Riparian corridors along the Mainstem and East Branch were found to be 25% forested while the West Branch exhibited corridors that were 27% forested to a width of 91 m (300 feet).

Warmwater habitat standards[1] (WWH) were employed when evaluating water quality of the Black River for this study. A minimum of 16 continuous kilometers (10 miles) of river must

[1] As defined and employed by the Ohio Environmental Protection Agency, Division of Surface Water

be in full attainment of WWH standards in order to qualify for designation. The longest continuous segment of the river found to be fully attaining these standards was 14 km (8.8 miles) of the East Branch. Terrestrial biological communities including mammals, birds, reptiles and amphibians were examined and compiled into an inventory. It was found that the species residing within the watershed are common to most rivers and streams in northern Ohio.

The examination and assessment of aquatic communities included benthic macroinvertebrates and fishes. Ohio EPA's Invertebrate Community Index (ICI) and Index of Biological Integrity (IBI) were employed respectively to determine aquatic community performance. The diversity and relative health of the aquatic communities within the Black River varied widely. Generally, it was determined that fish and macroinvertebrate communities within the watershed are typical of warmwater streams in Ohio and do not approach the diversity of those found in higher quality streams in the region.

In order to qualify for designation as a state Scenic River, a stream must be at least 75% free-flowing. Very little in-stream modification and/or impoundments of the Black River were observed during this study. All branches of the Black River are more than 75% free-flowing.

No more than 10% of the length of a state-designated river may flow through urban and/or industrial areas. The East and West Branches of the Black River met this criterion. More than 9.6 km (six miles) or 20% of the Mainstem flows through heavily urban and industrialized areas. The Mainstem failed to meet this criterion.

Several other important factors were considered during this evaluation of the Black River. In addition to previous criteria, the following attributes were also examined:

- historical and archaeological resources;
- endangered and/or threatened species found within the watershed; and
- recreational resources.

The Black River region has a rich and diverse history that became evident throughout this study. Several important prehistoric sites are located adjacent to the Mainstem near its confluence with French Creek. Recorded early European history in the region is also quite abundant, dating back to Jesuit missionaries who resided along the river in 1650.

Two species of state threatened fish reside within the Black River. These include a significant population of the bigmouth shiner (Notropolis dorsalis) found in the headwaters of the West Branch. This population represents one of only two populations of bigmouth shiners found in Ohio. The silver lamprey (Ichthyomyzon unicuspis) has also been collected in the Mainstem. Threatened birds breeding in the watershed include the sedge wren (Cistothorus platensis). Several state endangered and/or threatened plant species also were found in the region.

Public recreational facilities within the watershed are quite abundant. Several Lorain County Metropark facilities located along the Black River enjoy wide popularity and heavy public use. Numerous other city parks, golf courses and public fishing and hunting areas provide substantial recreational opportunities. Unfortunately, wide fluctuations in the flow of the river make canoeing only seasonally practical. Pleasure boating is common in the estuarine portion of the river.

In conclusion, this study identified impaired water quality as the most compelling shortcoming of the Black River with respect to scenic river designation criteria. Causative factors for water quality problems were not examined in this study. However, general contributors such as ongoing loss of riparian corridor and streambank erosion were observed as localized problems on nearly all segments of the river. Additionally, embedded substrates and turbidity caused by sediment and silt introduced from nonpoint sources were observed in numerous stream reaches. There is little doubt that these factors are significantly contributing to impaired water quality.

With improvements to general water quality and a concerted effort to restore vital riparian forests, segments of the Black River may meet all requirements for designation as a State Scenic River in the future. A series of recommendations designed to assist with such improvements, concluded the Black River Study.

DNAP Study Recommendations included:

1. It is vital that public and private landowners along the river implement concerted efforts to restore critical riparian habitat.
2. Efforts to encourage farm operators to enroll river bottom cropland into conservation reserve set-asides and/or the planting of grass waterways should be enhanced.
3. Concerted improvements in monitoring and enforcement are needed to insure compliance and reduce the harmful impacts of industrial discharges.
4. Ongoing efforts to expand conservation tillage should be continued and whenever possible, substantially enhanced.
5. Educational efforts promoting alternatives to riprap and other permanent channel modifications should be encouraged and enhanced.
6. More frequent bio-monitoring within the Black River should be undertaken whenever possible.
7. A volunteer stream quality monitoring program should be established.
8. Interpretive programs highlighting the natural features of the Black River should be more routinely scheduled throughout the watershed.
9. Creative activities for enlisting general public involvement in the Black River should be conducted more frequently.

Citizens' Role in River Protection

by David Orr, Oberlin College

Within the lifetimes of students now attending college, world population will double to 10-12 billion people, human actions will drive into extinction perhaps 20% of the species now on Earth, and the emission of heat-trapping gases will force global climate into a less stable and probably far less desirable state. Surveying these and other global trends, 102 Nobel laureates in science and 1,600 other scientists from 70 countries signed the World Scientists' Warning to Humanity in 1992, which reads in part:

> *Human beings and the natural world are on a collision course....If not checked, many of our current practices put at serious risk the future that we wish for human society and...may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about.*
>
> *We the undersigned, senior members of the worlds' scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated.*

A substantial and growing body of scientific evidence amassed since 1992 confirms the view that humans are at or near critical thresholds of planetary stability and ecological carrying capacity. Humankind is now in the first truly global crisis that concerns our survival as a species, the terms by which we might survive, and what it means to be human.

No problem mentioned by the world scientists is unsolvable in principle. All of the problems can be solved if we have the wit and will to act with intelligence, foresight, and dispatch.

One all-too-common response to the warnings, however, is to deny their validity. The extreme right has done this by ridiculing, obscuring evidence, and confusing the larger issues in question. The political left often denies by attacking science and inconvenient evidence as reflection of gender, power, and ethnic background. More sophisticated forms of denial take the form of excuses that we do not have the time or expertise to worry about issues beyond our specialization, especially those that make us uncomfortable in polite circumstances. Some even say that humankind has always triumphed in the past and ergo will do so in the future. Beneath all forms of denial is the hope that someone else will figure it out or that technology will save humankind in the nick of time.

What would it mean to face the mounting evidence that humankind is in real danger of mutilating the home we call Earth as well as our own humanity? First, it would require an attitude of utter candor and intellectual fearlessness to overcome complacency, self-congratulation, and busyness. We cannot easily or legitimately escape our culpability in the larger problems of our time.

Second, taking long-term global change seriously would require us to think more carefully about what our citizens need to know to live lives of service at a time when ecological stability can no longer be taken for granted. To continue environmental restoration efforts and expect to succeed without an informed citizenry would be like walking north on a southbound train.

We need to educate today's students so that tomorrow's citizenry is better informed and makes more sustainable choices. Among other things, today's students will need to know how to:

- power civilization by a combination of high efficiency and technologies that capture current sunlight, thereby reducing the likelihood of severe climatic change;
- reduce population growth, while safeguarding basic human rights;
- preserve species and entire ecosystems;
- grow their food sustainably, which means preserving soils, groundwater, and biological diversity while safeguarding human health;
- eliminate waste and pollution;
- restore degraded ecosystems;
- develop economies that can be sustained within the limits of natural systems;
- comprehend systems dynamics and long-time horizons;
- create artistic and cultural symbols necessary to redefine the human role in nature;
- create the political basis for an ecologically solvent democracy; and
- create a just distribution of power, wealth, and opportunity in a world increasingly divided between rich and poor.

Third, a vigorous response to global change would require us to think openly about things now taboo, including the narrowness with which we define liberal arts, the unexamined assumptions implicit in our technological fundamentalism, the controlling assumptions hidden in a curriculum organized by departments and disciplines, and the anthropocentrism that limits our willingness to see ourselves as only a part of a larger ecological community on a long evolutionary journey. Students will need to think in patterns and systems, yet – rhetoric to the contrary – we still emphasize disciplinary specialization. They will need a kind of lateral rigor to combine knowledge from different fields, yet we still educate them as if rigor were exclusively vertical and meant going deeper and deeper into a particular discipline. They will need a larger sense of beauty that insists on causing no ugliness, human or ecological, somewhere else or at some later time. Yet we still educate them as if art, science, morality, and the long-term human future were unrelated. The relevant planning questions have to do with how we might create the resources, time, and intellectual tolerance to question the reductionism and anthropocentrism buried in the organization of our academic and institutional life.

Fourth, taking the long-term human future seriously would require developing ecological literacy throughout society, from students through chief executive officers. We have a model in the continuing effort to develop and upgrade our computer literacy. We have other models having to do with gender, sexual orientation, and racial equality that have been institutionalized in policy guidelines and administrative procedures. The question is how we might institutionalize the capacity to think and act across discipline boundaries as if evolution, ecology, thermodynamics, and the long-term future really mattered.

Fifth, taking the long-term seriously would change how an institution or organization

operates. We have a moral interest in making certain that purchasing, investments, and operations do not undermine the integrity, beauty, and stability of the world. With that obligation in mind, could we set goals to power our institutions and organizations by a combination of greater efficiency, emerging solar technologies, and hydrogen in, say, 10 years? Why not? The limits are no longer technological or even economic, but those of imagination and commitment. Through the imaginative commitment of our purchasing and investments could we help leverage the emergence of a genuinely sustainable economy? And could we incorporate such things into educational curricula in ways that cross disciplinary boundaries while having a practical effect on the world? Why not? The important planning questions have to do with how we might imaginatively calibrate our stated values with our real institutional and organizational behavior. This must be done as part of a larger effort to teach our students and citizenry about their roles and responsibilities in protecting Earth's natural resources.

BREAKOUT GROUP DISCUSSIONS OF WATERSHED ISSUES

The aim of the breakout sessions was to celebrate and discuss progress and activities in the Black River watershed. Sessions were intended to consider the roles of various stakeholder groups in the progress that has been made and in what remains to be done. Thus, breakout sessions included:

1) the role of the agricultural community in river protection;

2) the role of the homeowner in river protection;

3) the role of local government officials in river protection; and

4) the role of the river/riparian land owners in river restoration.

Other breakout sessions addressed the following topics:

5) sustaining public interest in the RAP process;

6) sustaining environmental monitoring to measure progress, and

7) stormwater management issues.

Each session was asked to address two questions:

a) What progress has been made and needs to be communicated as an incentive to further action?

b) What key obstacles exist to further progress and what needs to be done to overcome these obstacles

Each session was well attended and a number of interesting ideas and recommendations for future action were offered. Detailed summaries of the breakout sessions follow.

The Role of the Agricultural Community in River Protection

At the start of the breakout session, a short slide presentation was given on the contributions of the agricultural community to improvements in water quality in the Black River watershed. Roughly half of the watershed is utilized for agricultural purposes, with Lorain County as one of the top agricultural producers in Ohio. The majority of the agricultural production is located in the upper watershed, south of the City of Elyria, in the area drained by the East and West Branches of the Black River. Participants noted that one of the basic issues facing watershed farmers is the problem of water quality versus water quantity. The soils in the watershed drain very slowly and the flat topography contributes to poor drainage. The solution to this problem has been the installation of millions of feet of field tile, which in turn can contribute to increased flow to streams leading to higher erosion rates and other water quality problems. A second issue facing the agricultural community is the problem of removing land from production to allow for riparian buffer zones between cropland and ditches, streams, and tributaries.

It was recognized that farmers in the area have participated in a variety of programs and projects that have helped improve water quality in recent years. In 1992 a $200,000 federally funded farm equipment buy down program allowed area farmers to save money on purchasing low or no till farm equipment. The Ohio EPA approved a $15 million (over 5 years) low-interest loan program for nonpoint source pollution abatement activities in the Black River watershed in 1995. This program allows agricultural producers and other land owners to obtain loans at 2-3 % below market rate for the purchase of conservation tillage and waste management equipment, installation of erosion control practices, and implementation of riparian area management, farm chemical management, and new water quality technologies. These programs have resulted in over 100 acres of installed grassed buffer strips in the area. In 1998 a Precision Farming Program was being initiated on 8,000 acres in the watershed as part of a $300,000 Section 319 grant. Around 2,500 acres of land have been enrolled in the Conservation Resource Program, removing them from agricultural production. Additionally, several old fields in riparian areas have been converted or returned to functioning wetland areas.

Although these programs and projects have been relatively successful, had good buy-in from the agricultural community, and contributed to improved water quality in the Black River, it was estimated that less than 10% of the improvements needed have been instituted. Obstacles to achieving more success in this area include the following:

- the costs of taking land out of crop production to build or provide riparian areas, buffer strips, wetlands, etc.;
- the mind set of some farmers regarding these programs and water quality improvements;
- inadequate farmer awareness and education about the economic and environmental impacts of these types of programs;
- the lack of connectedness between the agricultural community and the Black River and Lake Erie;
- the lack of ownership of lands that are farmed (many acres of farmed land are rented); and
- the lack of more incentives and monies to participate in some programs.

Breakout session participants agreed that more and better education of the agricultural community is key to overcoming many of these obstacles. Providing farmers and their associates with good, up-to-date information on the economic and environmental impacts and benefits from their participation in water quality improvement programs and projects is critical in achieving further improvements in the Black River watershed. Suggested strategies for accomplishing this included:

- making presentations at agricultural community meetings;
- continuing to market current programs and projects;
- providing demonstration areas of practices that can be visited on a regular basis;
- developing a program to provide awareness of the relation of agricultural practices to environmental health, fishing, recreational activities and Lake Erie;
- seek funding for expansion of current programs; and
- developing new programs and funding strategies to assist farmers in implementing environmentally friendly practices.

The Role of Home Owners in River Protection

This breakout session included an overview of what has been accomplished in the watershed by the various partners over the past few years. The participants recognized the successes in the reduction of point source pollutants through the upgrading of the various community wastewater treatment plants, improved pollution prevention activities by local industries, recycling, and waste stream reduction activities. It was agreed that future improvements in the water quality of the Black River will have to include the home owner and general public becoming actively involved in river protection activities. It was also agreed that the public needs to embrace the watershed system as a valuable resource to change the behaviors that create problems for the watershed.

The discussion centered on the premise that much of what can be done for the protection of the river will involve changing individual and community behaviors. However, before behaviors can be changed the attitudes regarding the value and purpose of a watershed system must move beyond an attitude that sees the river as just a conduit of water off of the land. The participants recognized the following must be done to change the general public's perception of the watershed:

- The Black River must be "marketed" using a social marketing approach where target groups are presented with information and tools to recognize that everyone plays a part in protecting the river system.
- The level of advocacy for the watershed must improve to provide a political and social base to create the tools and techniques to protect the river.
- The more access to the river, the more likely one is to recognize the vital "connectedness" we have to the river.
- Regulatory mechanisms should be considered to eliminate or reduce the nonpoint problems associated with failing or poorly maintained home sewage disposal systems.
- Public policy and decisions must include any potential impact on the watershed.

Specific suggestions from breakout session participants to address key issues are presented in Table 1.

The Black River Watershed has been a significant asset to the history and economic vitality of Lorain County and Northern Ohio. As communities, we have used this asset for improving our lives. As such, we must recognize and value this source of vitality to our communities.

Table 1. Suggestions for engaging communities and home owners in support of the river

ISSUE	SUGGESTION
The River needs to be promoted as a valuable resource to home owners and land owners to get lasting behavior changes that protect the watershed	Target population groups: School Education: • Develop age-appropriate educational techniques • Use specific and tangible methods (Hands On) • Teach an environmental ethic and promote the Black River as a valuable resource Home Owner/General Public: • Use print and electronic media to inform the public • Promote River events to provide the public with visual and tactile experiences on the river
Increase the amount of advocacy for the River	• Support community involvement in the RAP process • Stimulate volunteer activities on the River • Support clean up activities • Encourage individuals to support local land use planning, nonpoint source pollution reduction efforts, and storm water management activities • Promote home owner pollution prevention programs • Promote better access to the River
Public policy must account for the impacts of proposed actions on the watershed; policy makers must act on behalf of the watershed	• Regulatory methods should be considered to control nonpoint pollutants such as home sewage disposal systems, animal waste, construction site, and stormwater runoff
Provide home owners the tools to protect the riparian zones of the river	• Use agency resources to encourage home owners to be involved in pollution prevention (Solid Waste District, Health Departments, Soil and Water Districts, U.S. Department of Agriculture, EPA, etc.) • Promote Conservation Easements and Wetland Reserve Programs • Support tax abatements for those land owners that protect the riparian zones

The Role of Local Government Officials in River Protection

Ron Twining, Planner III/Acting Director of Lorain County Community Development Department, provided an overview of Lorain County's efforts in working with Carlisle Township on a natural resource-based, comprehensive, land use plan and model zoning study. Carlisle Township was selected since it is located in the near geographic center of Lorain County; it contains extensive lengths of both the east and west branches of the Black River. The Township is experiencing development pressures in the north from the urbanized areas. To the south, the Township remains predominately rural, with agriculture as its primary industry; however, two years ago the last dairy farm sold its herd and ceased operation. A four-lane divided highway splits the Township in two. Politically the Township has children attending four different school districts. The majority of soils are poor with several sand ridges that have proven to be highly desired both by farmers and developers.

All that is good in Lorain County's future, as well as the least desirable elements of our environment, are present in Carlisle. Farmland is being lost to residential development at the same rate in both Carlisle and the remainder of the rural parts of Lorain County. Funds provided by the Lake Erie Protection Fund will be used to study methods of evaluating proposed developments and the resulting impacts on the natural environment. This project is just getting started, but holds much promise for the water quality of the Black River if the proposed policies are implemented in Carlisle and other locations.

The Carlisle Township project was shared with breakout session participants as a means of showing the leadership role Lorain County government is attempting to take with township development. Key issues and concerns raised by breakout session participants included the following:

- Communities need to tackle stormwater management issues head on. There needs to be a better understanding of how to deal with stormwater as it passes through one community to the next and so on.
- Communities need to have stormwater agreements. Once the agreements are obtained, there must be a method to prioritize the various stormwater issues.
- The State of Ohio has existing rules on water rights and riparian rights, but they are antiquated. There is a need to review Ohio laws and recommend changes relative to the stormwater issue facing communities and adjoining property owners.
- As population and development intensifies, stormwater management becomes a much larger issue. In the future, if we want to control nonpoint source pollution problems, we may need to establish stormwater treatment through the use of wetlands, naturalized areas, etc.
- Communities need some clear authority when dealing with stormwater management systems. Is stormwater best dealt with by a government as a public utility? Or is it dealt with better as a developer-designed treatment system using naturalized plants and other elements to purify the stormwater being discharged?
- Ohio needs to have a better system or process for surface drainage planning. Presently, no system exists.
- Planners and scientists need to take the lead on the issue of stormwater management. Do not let the politicians get hold of this issue. Stormwater management MUST BE

watershed based, NOT political jurisdiction based. That is to say, until such time that the stormwater within the Black River watershed is managed consistently throughout the entire watershed, the problems will remain. A small amount of agricultural runoff near the uplands of the Black River watershed does not denigrate the water quality in Sullivan Township. Why should Sullivan Township be concerned? The same lack of concern may be true as the Black River passes through each township. Ineffective septic systems, soil erosion, fertilizer and pesticide runoff all contribute to an even bigger problem for the "next guy". We need to think and act based on the entire watershed and not just what our own jurisdiction can and has contributed to a larger problem.

- We are handicapped by political jurisdictions. But the sad thing is we allow this to be our excuse.
- Organizations like the Lorain County Alliance are a great step in the correct direction. There is a need to work with them and go the next step and cross county lines when it is needed. Priority must be given to covering an entire watershed as a district. County or corporation limits are only lines on paper; lines cannot stop water and they should not stop watershed jurisdictions. This will require legislative action.
- Are there any common goals that communities have when it comes to treating stormwater? There appears to be none. The "everyone-for-themselves" attitude must stop. We need to find common ground before we kill our environment. Stormwater is the next great frontier.
- The Black River watershed must look into various technologies for treating and dealing with stormwater.
- Wisconsin and Oklahoma are two States that have had some success. Ohio needs to learn from their success and build on their efforts.

The Role of River/Riparian Land Owners in River Restoration

This breakout session was initiated with brief presentations on the conceptual basis for and practical techniques of river restoration by riparian land owners. Participants agreed that there is a need to get more landowner buy-in for riparian land protection and management. To be able to get this buy-in, we must increase public awareness of riparian functions and benefits. For example, rivers need to move and there are many benefits derived from natural floodplains and hydrological cycles. More effort needs to be placed on improving landowner sensitivity and awareness of the river ecosystem and their connection to it. People need to engage themselves with the river. Once people are engaged, they will become more knowledgeable and aware, and hopefully adjust their actions accordingly. Different approaches for engagement and action will be required for urban and rural areas.

Breakout session participants recognized that although much has been accomplished, much remains to be done. For example, much needs to be done to:

- increase availability of services to land owners;
- demonstrate effective riparian land practices;
- quantify and communicate economic, environmental, and societal benefits of sound riparian practices; and
- provide incentives like tax relief.

In certain situations (e.g., urban areas), there may be a need for regulation or at least the threat of regulation to bring about the necessary changes. Following discussion of these issues, participants identified obstacles to further progress and provided suggestions of how to overcome the obstacles (Table 2). Participants felt that if action was taken on these suggestions to overcome obstacles, it would help build the capacity for ecosystem-based management of the watershed. An important implementation tool will be the Urban Streams Program being implemented in selected Soil and Water Conservation Districts as part of Ohio Department of Natural Resources' Coastal Management Plan for Lake Erie. Urban stream specialists have been hired to work with landowners on critical riparian/river areas in need of protection and restoration.

Sustaining Public Involvement in the Remedial Action Plan Process

This breakout session was initiated with a brief presentation on the nature of public involvement in the RAP process. In the case of the Black River RAP, an interested public helped create a community-led effort to focus on restoring the Black River basin. While progress has been made, continued involvement of many citizens, and particularly those who live or own property along the river, is critical.

It was noted that there are various types of public involvement in the Black River RAP, including:

- serving on the coordinating committee to help steer the RAP process;
- volunteering to implement goals and objectives, and participating in activities of the RAP; and
- working to raise the general awareness of citizens whose individual actions help protect the river.

Participants noted that each RAP is unique and at a different stage of development. Three primary models were discussed:

1) some RAPs operate as a coalition of separate groups, whose activities, sometimes intentionally and sometimes not, coincide with the goals and agenda of the RAP;
2) some RAPs have a strong citizen component, with the public very actively involved; and
3) a few RAPs emphasize, and wait upon, regulatory action as the basis for remediation of problems.

Table 2. Suggestions to overcome obstacles to effective river restoration by riparian land owners.

OBSTACLE	SUGGESTIONS TO OVERCOME OBSTACLE
Limited knowledge and understanding of technology for riparian preservation and restoration	Increase education, awareness, and involvement
Insufficient resources	Inventory needs and available resources; create opportunities through partnerships
Apathy	Increase education, marketing, and learning by doing; apply "Tom Sawyer" philosophy
Engineering obsession with right angles (e.g., streams meander naturally)	Convene workshops to educate engineers and planners; educate next generation of engineers and planners about ecosystems and natural design
Obsession with tidiness and manicured appearance of floodplains and riparian corridors	Redirect energies to other locations and projects; find suitable alternatives
Not knowing "What's in it for me?"	Quantify benefits and communicate them in understandable terms; increase education
Resistance to change	Promote demonstration projects; encourage biologically-based (old school vs. new school) management actions; increase education and outreach
Thinking only in "The Box"	Make "The Box" bigger; demonstrate and communicate successes
Fear of change	Clearly present alternatives and demonstrate benefits to change
Lack of political will	Build consensus; invite everyone to "the dinner"
Lack of sharp teeth (e.g., threat of regulation)	Find creative ways to encourage rather than require; promote greater education, outreach, technology transfer, benefits transfer, and use of financial incentives

Participants agreed that sustaining public interest and involvement was crucial for a successful RAP process, and shared information on how they have seen this done. Suggested involvement strategies include:

- focusing on an entire watershed and not just a critical area;
- understanding the issue as one of ecological literacy and developing activities to "reconnect" people to their "place";
- framing the issue in terms of the people's "backyard" to gain understanding and ownership;
- developing a strategy to "market" the RAP to the public (i.e., we need to learn how to market better and smarter);
- identifying common problems throughout the target area and building public/private partnerships;
- creating a waterfront park to get people down to the river;
- investing in capacity building of citizen groups and helping them with networking and fund raising;
- stressing the connection between urban and rural areas; and
- making the linkage between river protection/restoration and economic development.

The breakout group listed activities that have proven to be successful in efforts to get people involved in river protection/restoration. Examples of such activities include:

- publishing a newsletter;
- holding public information sessions;
- holding a river festival;
- developing RAP related environmental education materials for schools;
- sponsoring professional development seminars for teachers on watershed issues;
- having displays at festivals;
- offering "hands-on" stream bank restoration activities;
- holding river cleanup events; and
- sponsoring a stormwater sewer stenciling project.

The breakout session concluded with the group summarizing its advice regarding sustaining public involvement in the RAP process into three key findings:

- getting people out on the river is absolutely essential;
- education is a key, both public and school-based education; and
- linking river improvement to economic development is a helpful way to increase public support.

Sustaining Environmental Monitoring to Measure Progress

This breakout session began with an overview of Ohio EPA's monitoring programs. It was observed that monitoring is important because it links actions (that are made) to knowledge of conditions in the river. Ohio has been a leader in the use of biological indicators and has followed a watershed approach to intensive monitoring programs. The state schedules monitoring so that each major watershed in the state is investigated on a five year cycle. The state continues to have limited resources to conduct these investigations, so the trend is downward.

A second presentation discussed current monitoring activities by citizen volunteers in the watershed. Some frustration was expressed that substantial data had been collected, but never compiled.

The discussion in this breakout group centered primarily on the need to make volunteer citizen monitoring efforts more useful. It was agreed that voluntary monitoring has several uses. One goal is to sustain interest in river conditions. It needs to be recognized that citizen volunteers are not going to be able to replicate scientific techniques required for scientific or regulatory purposes. Some parameters are more appropriate than others in this context. For example, macroinvertebrate data collection by citizen volunteers is a good focus because it can produce meaningful information with a limited investment in training and deployment of resources.

Models for citizen data collection from around the country should be looked at. Simplified testing and training processes are available, as are simplified approaches to quality assurance and quality control. The U.S. Geological Survey has such a model.

There are several good examples available of how citizens can be involved in a process for river cleanup, providing useful information to public authorities. For example, there is a good river monitoring model in the Hamilton Harbour (Ontario) area.

There is a need to clarify the purposes of volunteer monitoring. It is for education? Is it to facilitate cleanups?

The discussion also focused on the question of what constitutes an adequate monitoring program for regulatory purposes. U.S. EPA has one model. Reports of river conditions vary considerably among states. Some reports present sketchy results on a very large percentage of their water bodies. Others are more conservative.

Most states rely almost exclusively on chemical data to assess in-stream conditions. Ohio is one of the few that relies significantly on biological monitoring. This approach is lower in cost and can discern trends that are not susceptible to chemical data analysis. Chemical monitoring has valuable uses. It is best in stable, low flow conditions and can effectively be used to assess point source discharges. Biological monitoring is a relatively new concept. Some states do this monitoring, but don't incorporate the criteria in water quality standards.

One important need is to develop an integrated biological monitoring program around the Great Lakes. The states, provinces, and federal governments should establish long-term monitoring sites in the Great Lakes that track consistent biomarkers.

Citizens should understand that, in the case of a suspected discharge, the analysis needed is resource intensive, well beyond that which citizens volunteers can muster. One area where

citizen volunteers can help is to monitor sediments in tributaries to help determine where sediment loads are coming from ("mud-watchers"). Citizens can also help keep an eye on other stream conditions. Procedures should be developed for "telling on a stream" and reporting this to Ohio EPA. There has been some positive experience in training city workers to do this, for example.

Guidelines are needed that enable citizen monitors to register observations in such a way that agency follow-up is made easier. Procedures on documenting "what, where, and when" are needed that can be linked to follow-up steps.

A long-term commitment to protect the quality of the habitat could be a useful focus for monitoring by citizen volunteers. The citizens' Qualitative Habitat Evaluation Index or QHEI, under development in Ohio, is one useful tool.

More discussion is needed on how volunteer monitoring impacts the decision-maker. It was pointed out that volunteer monitors sometimes lost interest when their educational goals had been fulfilled because they rarely saw the impact of their work on stream health.

Making data collected by state agencies more accessible, such as the 305(b) report, would also be useful. The IJC did a resource analysis recently showing decreasing levels of effort in regards to monitoring. There is a perspective that funds for monitoring are always at risk unless they are visibly tied to actions.

State health department data on bacteria levels in public bathing waters is hard to use. There are initiatives underway in Ohio to collect more useful data in this arena.

Breakout session participants summarized the current state of monitoring as follows:

- volunteer monitoring has mostly focused on data collection with little consideration of end uses of the data;
- monitoring is being employed as a watershed education tool;
- the State of Ohio uses biological monitoring for attainment determination in streams and chemical monitoring is used to determine compliance of point sources;
- there are models for a more robust role for citizens in "telling on a stream";
- Ohio's water monitoring resources recently increased due to Ohio EPA's ability to collect fees, but long-term the trend is downward; and
- standard approaches to biological monitoring have a long way to go in the Great Lakes.

Breakout session participants provided the following advice on the direction of future monitoring in the watershed:

- there is a need to engage the public in understanding and support for long-term environmental monitoring, encouraging the public to see the need to connect remedial actions in the Black River with knowledge about river conditions;
- programs of valid (usable) data collection by volunteers need to be developed that include effective training and quality control mechanisms;
- the availability of government agency data and volunteer-generated data, to the public at large, needs to be increased;

- realistic goals for monitoring programs by citizen volunteers need to be developed that recognize what citizens can contribute practically;
- emphasis needs to be placed on the importance of informed observation by citizenry empowered with sufficient knowledge to report violations;
- biological monitoring that relates the overall health of the stream by states needs to be encouraged (versus the current focus on chemical monitoring); and
- common approaches to biological monitoring need to be implemented and sustained throughout the Great Lakes Basin.

Stormwater Management Issues

This breakout session was initiated with brief introductory presentations from Lorain County Engineer Ken Carney and Professor Phil De Groot of Cleveland State University. Ken Carney explained how staff from his office are inventorying every drainage outlet and stream in Lorain County for prioritizing future improvements and fund expenditures. He also noted the progress in making determinations on 17 new large stormwater detention facilities.

Phil De Groot related the conflicting interests at work at the local level that actually cause improper stormwater management decisions. He also avowed how simple it is to correct many of the stormwater management problems. It was noted Ohio lacks continuing education requirements for licensed professional engineers and that Ohio universities have limited hydrology course work requirements for engineering students.

Following the introductory presentations, a facilitated discussion was held on what could be done to address stormwater management issues. Suggestions from breakout group participants included:

- as stormwater management evolves, it must begin to include water quality components and treatment (the RAP should promote a county initiative on management of stormwater volume and quality);
- it was suggested by one participant that professors should run for office, if for only one term, to enact appropriate laws;
- it would be timely to add hydrology course work requirements to the curricula for engineering students and to promote continuing education courses on hydrology for practicing engineers;
- a county or state rule on erosion control, stormwater quality management and flood hazard areas should be promulgated;
- greater emphasis must be placed on addressing habitat components in land use planning, local ordinances, zoning, etc.;
- concern was expressed for "unfunded mandates" in upcoming National Pollutant Discharge Elimination System regulations;
- the Black River RAP should promote habitat-based, water quality stormwater rules for the watershed;

- water quality features should be added to 17 planned, large, stormwater control basins in the county; and
- Ohio EPA should examine allowing Division of Environmental Financial Assistance funds to be used more readily for RAPs.

Breakout session participants recommended that the RAP can and should embrace these concepts.

CONCLUSIONS AND RECOMMENDATIONS

The Symposium was well received by all participants. Conclusions and recommendations from the day's proceedings were compiled by the Symposium Steering Committee and include the following (please consult the summaries of the afternoon breakout sessions for more detailed discussion and recommendations):

- Substantial progress is being made in implementing the Black River RAP and restoring uses throughout the watershed (e.g., progress toward elimination of liver tumors in the brown bullhead population, improvements in sediment quality, etc.).
- However, much needs to be done to protect what's been gained and to further rehabilitate degraded areas in the watershed. Strategies are needed to address land use changes that threaten aquatic life communities and habitat. The Black River RAP has identified protection of the riparian corridor and urban sediment and erosion control programs as especially urgent. Participants confirmed the importance of protecting and restoring riparian corridors as a key factor in protecting what's been gained.
- The community-based process embodied in the Black River RAP has taken a leadership role in developing and advancing efforts to protect the Black River and this process needs to be sustained for the future.
- This community-based process requires the active involvement of informed citizens who are ecologically literate and willing to act as stewards of the watershed in their own backyard.
- As substantial progress has been made in controlling point sources of pollution, more effort now needs to be placed on addressing land use activities that contribute to nonpoint source pollution problems.
- Regulatory mechanisms should be considered to eliminate or reduce the nonpoint problems associated with failing or poorly maintained home sewage disposal systems.
- Greater emphasis should be placed on addressing habitat components in land use planning, local ordinances, zoning, etc.
- Participants recommended that, as a priority, the County enact an Urban Sediment Erosion Control Program to address stormwater management issues of new development. The efforts of the Lorain County Alliance to encourage an interjurisdictional

approach to the stormwater management problems is applauded and should continue to be supported by the Black River RAP so that a comprehensive approach, that considers both water quantity (flooding) and water quality issues at the watershed level, is pursued. There needs to be a better understanding of how to deal with stormwater as it passes through one community to the next.

- There is a need to more effectively engage the public in understanding the importance of and support for long-term environmental monitoring. Citizens can have a direct role in this effort, but this means that realistic goals for monitoring programs by citizen volunteers need to be developed, goals that recognize what citizens can contribute practically. To achieve this, effective volunteer training and data quality assurance procedures must be established.

- The Black River RAP should heighten its profile in the community so that the important messages of the RAP program are more widely heard and acted upon.

- From a nonpoint source perspective, much of the "low hanging fruit" has been picked. Therefore, federal efforts through the Natural Resource Conservation Service should be focused on "picking the next lowest hanging fruit" which means implementing a targeted initiative at farmers who have not implemented best management practices (BMPs). Much more needs to be done to get these local farmers to expand use of BMPs in order to meet our collective goals of restoring and protecting all uses in the Black River watershed.

- Ohio EPA should continue to sustain the Black River RAP process. Ohio EPA, Ohio DNR, and other state agencies should focus state funds on implementing high priority actions and projects identified by the Black River RAP Coordinating Committee. Ohio EPA should consider allowing Division of Environmental Financial Assistance funds to be used more readily for RAPs.

- Participants further recommended that federal legislation is needed that recognizes and supports the community-based approach to watershed planning and implementation.

- The recent study by Ohio DNR that evaluated the Black River's potential for Scenic River status concluded that substantial portions of the riparian zone are in excellent condition, but need a sustained focus effort to preserve them. The Black River RAP Coordinating Committee should continue and expand its efforts to promote riparian protection at the household, community, and watershed level.

- The IJC and its Great Lakes Water Quality Board must continue to be champions for community-based RAP processes. The International Joint Commission and the Great Lakes Water Quality Board are in a unique position to celebrate the progress of RAPs and help sustain community-based RAP groups working to restore and sustain uses in the Areas of Concern.

- Finally, the Great Lakes Water Quality Board should continue to convene public meetings with RAP groups in Areas of Concern. Such meetings give the public an opportunity to learn more about how local RAP efforts fit into the larger Great Lakes context. Further, these public meetings give members of the Water Quality Board and RAP groups important opportunities to meet, share, and learn from each other. This also provides a wonderful community building project for local RAP groups.

APPENDIX I

The Black River RAP and IJC's Great Lakes Water Quality Board present a symposium on. . . "Protecting What's Been Gained in the Black River"

Spitzer Conference Facility, 301 Broadway Avenue, Lorain, Ohio
October 8, 1998

AGENDA

8:00 A.M.	**Registration and Coffee**
8:30 A.M.	**Welcome and Opening Remarks** **Mayor Joseph Koziura, City of Lorain; Lorain County Commissioner Betty Blair; David Ullrich, U.S. Co-Chairman of Great Lakes WQB, Acting Regional Administrator U.S. EPA**
8:45 A.M.	***"Protecting What's Been Gained in the Black River"*** **Don Schregardus, Ohio EPA, Director**
9:00 A.M.	**Research Presentations on the Black River:**
11:30 A.M.	• **Fish Communities and Habitat Status in the Black River Watershed** **Presentation by: Roger Thoma, Ohio EPA** • **Ship Channel Water Quality and Causative Factors** **Presentation by: Paul Anderson, Ohio EPA** • **Improvement in the Health of the Brown Bullhead (Decreased Tumor Prevalence)** **Presentation by: Paul Baumann, USGS and Ohio State University** • **Assessment of Sediment Quality in the Black River Watershed** **Presentation by: Allen Burton, Wright State University** • **Understanding the Characteristics and Criteria for the Designation of a Scenic River (1997 Black River Study)** **Presentation by: Russ Gibson, Ohio Department of Natural Resources**
11:30 A.M.	**Lunch and Keynote Speaker**
1:15 P.M.	**"Citizen Role in River Protection"- David Orr, Oberlin College**
1:20 P.M.	**Facilitated Breakout Session I:**
2:20 P.M.	**(1) The role of the agricultural community in river protection** **(2) The role of the homeowner in river protection** **(3) The role of local government officials in river protection** **(4) The role of river/riparian land owners in river restoration**
2:30 P.M.	**Facilitated Breakout Session II:**
3:30 P.M.	**(4) The role of river/riparian land owners in river restoration** **(5) Sustaining public interest in the Remedial Action Plan process** **(6) Sustaining environmental monitoring to measure progress** **(7) Storm Water Management Issues**
3:30 P.M.	**Reports from the Breakout Sessions**
4:30 P.M.	**Closing Comments - IJC Commissioner Alice Chamberlin**

APPENDIX II

First Name	Last Name	Organization Name
William	Allison	Lorain County General Health District
Paul	Anderson	Ohio Environment Protection Agency
Donald	Arcuri	Lake Erie Lamp Binational Forum
Jared	Bartley	Case Western Reserve University
Christopher	Bauer	City of Lorain - Community Development Dept.
Paul	Baumann	Ohio State University
John	Beeker	Northeast Ohio Areawide Coordinating Agency
Thomas	Behlen	International Joint Commission
Russell	Bimber	
Betty	Blair	Lorain County Commissioner
James	Boddy	Lorain County General Health District
Doug	Bondy	International Joint Commission
Dr. Allen	Burton	Wright State University
Kay	Carlson	Cuyahoga River Community Planning Organization
Kenneth	Carney	Lorain County Engineer
Alice	Chamberlin	International Joint Commission
Edith	Chase	Cuyahoga RAP
Molly	Chidsey	National Wildlife Federation
David	Cornicelli	Seventh Generation Staff
Pam	Davis	Northeast Ohio Areawide Coordinating Agency
Philip	DeGroot	Cleveland State University
Doug	Dodge	Ontario Ministry of Natural Resources
Richard	Draper	New York State Dept. of Environmental Conservation
Sarah	Eddleman	Case Western Reserve University
George	Elmaraghy	Ohio Environmental Protection Agency
George	Espy	Seventh Generation
Natalie	Farber	Ohio Environmental Protection Agency - Ashtabula RAP
William	Fuligrabe	
Gary	Garcia	National Engineering & Contracting Company
Philip	Gehring	U. S. Environmental Protection Agency
Cheri	Gersak	Seventh Generation Staff
Dana	Geurts	Case Western Reserve University
Russ	Gibson	Ohio Department of Natural Resources
Kerry	Glaser	Greensphere Consulting
Michael	Goffin	Environment Canada
Michael	Greenburg	Lorain County Solid Waste District
Christina	Guk	Brunswick Hills Township
Gary	Gulezian	U.S. Environmental Protection Agency, Great Lakes National Program Office
Sharon	Halkovics	Northeast Ohio Areawide Coordinating Agency
John	Hamilton	Lorain County Engineer
John	Hartig	International Joint Commission
Greg	Hill	Wisconsin Department of Natural Resources
Tom	Holmes	Lorain County Soil & Water Conservation District
Ava	Hottman	Ohio Environmental Protection Agency
Keith	Johnson	City of Oberlin

APPENDIX II, cont'd

First Name	Last Name	Organization Name
Sadhu	Johnston	Seventh Generation
Mayor Michael	Keys	City of Elyria
Dorothy	Kloos	Lorain County General Health District
Mayor Joseph	Koziura	City of Lorain
Jack	Kurowski	Lorain City Health Department
Julie	Letterhos	Ohio Environmental Protection Agency
Jeremie	Maehr	Shaker Lake Nature Center
Howard	Maier	Northeast Ohio Areawide Coordinating Agency
Madhu	Malhotra	Environment Canada
Dan	Martin	Lorain County Metro Parks
Brad	Masi	Oberlin College
Craig	Mather	Metro Toronto Region Conservation Authority
Percy	McGee	U.S. Dept. of Agriculture
John	McLeod	Cuyahoga County Board of Health
B.J.	Meder	Cuyahoga County Board of Health
Victoria	Mills	Cuyahoga River Community Planning Organization
Jim	Nichilos	Plain Dealer
Richard	Novak	Lorain Port Authority
Glenn	Odenbrett	Case Western Reserve University
David	Orr	Oberlin College
Ken	Pearce	Lorain County Health Commissioner
Stacy	Poman	
Kelvin	Rogers	Ohio EPA - RAP Programs
Donald	Romancak	City of Lorain - Community Development Dept.
Jan	Rybka	Cuyahoga River Community Planning Organization
Natalie	Saikaly	Cuyahoga River Community Planning Organization
Karen	Schaefer	WCPN - Cleveland Public Radio
Karl	Schneider	Natural Resources Conservation Service – U.S. Dept. of Agriculture
Don	Schregardus	Ohio Environmental Protection Agency
Vic	Shantora	Environment Canada
Griff	Sherbin	Environment Canada
Michael	Sigg	City of Oberlin
Gilbert	Slavik	USS/KOBE Steel Co. & Black River RAP
Mark	Smith	Lorain County General Health District
Kelly	Standridge	Medina Soil & Water Conservation District
Ray	Stewart	Vermilion High School
David	Stroud	Ohio Environmental Protection Agency
Elizabeth	Thames	Congressman Sherrod Brown's Office
Roger	Thoma	Ohio Environmental Protection Agency
Ron	Twining	L.C. Community Development
David	Ullrich	U.S. Environmental Protection Agency, Region V
Charles	Undrisky	City of Lorain - Community Development Dept.
Jeff	VanLoon	Ohio Department of Natural Resources
Andy	Vidra	Northeast Ohio Areawide Coordinating Agency
Jerry	Wager	Ohio Division Soil & Water Conservation

Elizabeth	Whippo Cline	Center for Environmental Science Technology & Policy
Tim	White	Erie Soil & Water Conservation District
Mike	Whitmore	Building Industries Association
Peter	Wise	Illinois Environment Protection Agency
Cheryl	Wolfe	Oberlin College
Hardy	Wong	Ontario Ministry of Environment
Wendy	Woolwine	Seventh Generation Staff
Greg	Worcester	City of Elyria Wastewater Treatment Plant
Bob	Wysenski	Ohio Environmental Protection Agency
Betsy	Yingling	Northeast Ohio Regional Sewer District
Mike	Zawacky	Morning Journal

APPENDIX III

International Joint Commission Student Forum
Oberlin College

On the evening of October 7, 1998 a student forum was held at Oberlin College where local university students and college professors were given the opportunity to ask questions of Canadian and U.S. members of the IJC's Great Lakes Water Quality Board. The forum attracted approximately 50 students and 10 local citizens. The student forum was very well received. Discussions were wide ranging, with considerable questions. The student forum agenda is presented below.

Student Forum Agenda

Welcome	**George Espy, Executive Director, Seventh Generation**
History of the Black River Remedial Action Plan (RAP)	**Cheryl Wolfe Environmental Health and Safety Office, Oberlin College**
Role of Ohio EPA in the RAP process and the Lake Erie Water Quality Index	**Don Schregardus Director of the Ohio EPA**
What is the IJC?	**John Hartig Secretariat to IJC's Great Lakes Water Quality Board**

Discussion with Water Quality Board Members

- **Doug Dodge, Manager, Fish and Wildlife Branch of Ontario Ministry of Natural Resources**
- **Peter Wise, Associate Director of the Illinois EPA**
- **Craig Mather, Chief Administration Officer, Metro Toronto and Regional Conservation Authority**
- **Mike Goffin, Director of the Great Lakes and Corporate Affairs, Ontario Region of Environment Canada**
- **Percy McGee, Natural Resources Conservation Services, U. S. Department of Agriculture**
- **Gary Gulezian, Director, Great Lakes National Program Office, U.S. EPA**
- **George Elmaraghy, Ohio EPA**

Student Networking and Closing Remarks	**George Espy**